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Remarks:
This application was filed on 07 - 10 - 2002 as a divisional application to the application mentioned under INID code 62.

(54) Shopping cart mounted portable data collection device with tethered dataform reader

(57) A retail consumer product information display system comprises a portable terminal (10) accessible to a retail consumer at a retail outlet and at least one remotely located base unit (58). The remotely located base unit (58) includes a database of product information and means for retrieving the product information from the database in response to a request. The terminal (10) includes: a transceiver adapted for transmitting the request to the base unit (58) and receiving the product information from the base unit (58); a visual display (14) for displaying the product information to the retail consumer; an imager (22) having a two-dimensional photo-sensor array (170); means for storing a digital representation of an image sensed by the photo-sensor array (170); and means for generating the request from the digital representation.

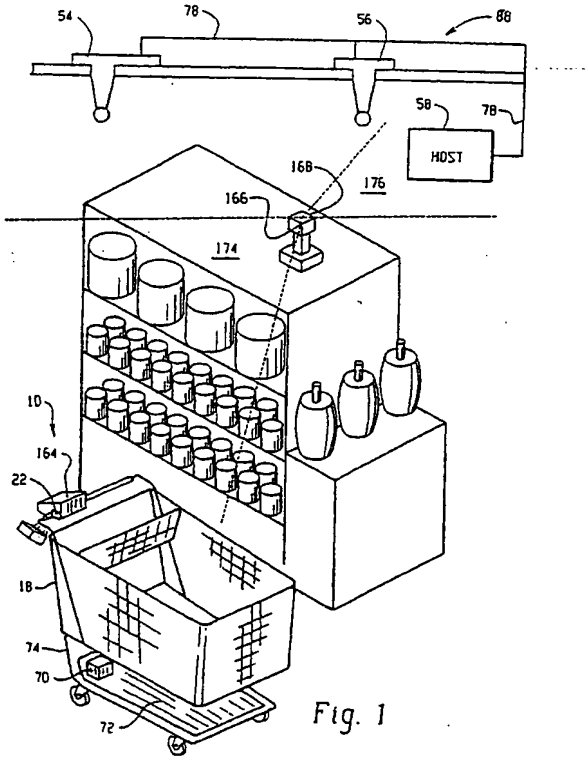


Fig. 1

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Description

Field of the Invention

[0001] This application is a continuation-in-part of co-pending U.S. Patent Application Serial No. 08/668,343, filed June 26, 1996. This invention relates to a customer information network for a retail store and, more particularly, relates to a network comprising a plurality of customer information terminals each adapted for mounting on a shopping cart and displaying information to the customer and a host computer wirelessly coupled to the terminals and storing data to be transmitted to the terminals and displayed to the customer.

Background of the Invention

[0002] In a retail store or grocery store, a customer will typically push a shopping cart through the aisles selecting items of merchandise. When the shopper is finished, he or she proceeds to a cash register/data terminal in a check-out area of the store. The cash register/data terminal typically includes a hand held and/or fix mounted dataform reading and decoding assembly ("dataform reader"). If a fix mounted dataform reader is being used, a store clerk presents each item's bar code dataform to the dataform reader, that is, the dataform is moved along an upper surface of a glass window under which the dataform reader is mounted. If a hand held dataform reader is being used, the clerk "aims" the reader at each item's dataform as the item moves past the terminal. In each case, a "good read and decode" signal will be actuated after each successful dataform read and decode to notify the clerk that the item's dataform was successfully read and decoded. The signal may be an audible tone or "'beep". If no "beep" is heard, the clerk will repeat the reading process for the item until successful.

[0003] Each item's dataform includes a product identifier which is used to retrieve a product description and price of the item from a remote database. A visual display on the terminal displays the item's product description and price for each item upon reading and decoding the dataform. When all the items being purchased by a customer have been presented to the reader, the terminal provides a total price for all the customer's items and prints a register receipt listing a product description for each item and its price, a subtotal for all items, a tax amount and a total amount due. The amount tendered by the customer is input by the clerk using a terminal keypad. The amount tendered and change due are also printed on the register receipt. The clerk collects payment from the customer and dispenses any change.

[0004] A number of problems are associated with such a cash register/data terminal system including: (1) inconvenience for customers waiting in long check-out lines; (2) use of valuable floor space for the check-out area when a number of cash register/data terminals are utilized; (3) human resource costs for attending to the checkout procedure; and (4) product prices have to be either printed on labels affixed to each item or marked on shelving adjacent the item's shelf space so a customer knows the price of a selected item.

[0005] In one proposed alternative system, a customer is presented with a portable hand held data terminal including a hand held dataform reader when he or she enters the store. The customer uses the reader to read a bar code dataform on each item prior to or concurrently with placing the item into his or her shopping cart. A memory in the portable data terminal stores a retrieved product description and price for each selected item. At the check-out area, a store clerk merely prints a register receipt based on the data stored in the dataform reader and collects payment from the customer.

[0006] There are a number of disadvantages associated with this proposed alternative portable data terminal system. First, the customer must carry the data collection device during the shopping session. The device represents another item which must be handled by the customer in addition to the shopping cart, items being purchased and possibly children. This is inconvenient for the customer and can lead to the device being damaged through mishandling or dropping of the device by a hurried customer. Second, the retailer must dedicate floor space to the entrance area where the devices are presented to and collected from customers. Third, the device is susceptible to being stolen or inadvertently removed from the premises.

[0007] The subject invention provides a more convenient, economical, and efficient system for providing customers with a portable data collection device including a dataform-n reader which can be used by a customer to read dataforms of items selected for purchase during a shopping session.

[0008] European Patent Specification 0170194 and International Patent Application WO89/03555 each relate to product information systems for use on a shopping trolley having the features defined in the pre-characterising part of claim 1 below.

[0009] Co-pending European Patent Application No. 97305808.4 (published under the number EP 837406) relates to a data retrieval system and method concerned with accessing the Internet and avoiding the accessing of unwanted files by coding the file address in a bar code symbol which can be read and decoded to access the relevant file automatically.

[0010] According to the present invention there is provided a retail consumer product information display system as defined in claim 1 below.

[0011] A retail consumer product data collection and information system includes a base unit and at least one portable data terminal. The base unit includes a transceiver and a data storage. The base unit is adapted for storing product information, such as recipes, prices, discounts, ingredients, and the like, associated with the wares of a retail establishment. The transceiver is able

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to query data from its data storage in accordance with received inputs. Such inputs are derived from one or more, associated, portable data terminals. Each data terminal includes a complementary transceiver, as well as a system providing a user interface which solicits user input, structures a query for the base unit, receives and displays a received result of this query. The system is advantageously disposed in a fixed manner on a shopping cart or the like.

[0012] The system further provides a mechanism by which information relating to a position of the portable data terminal relative to a retail outlet is accumulated and communicated to the base unit for processing and displaying information related thereto.

[0013] The system provides for receiving product information from indicia disposed on product packaging via a bar code reader associated with each remote data terminal.

[0014] The system includes a locator which facilitates location of the remote data terminal relative to a retail distribution establishment and processing, communicating, and displaying relevant product information to a remote data terminal relating to such position.

[0015] An advantage of the system is the provision of a retail data tracking system which provides an easy to use source of relevant product and pricing information to the consumer at a point of product selection.

[0016] A further advantage of the system is the provision of a data acquisition and tracking system which minimizes human resource requirements at a retail establishment.

[0017] Yet a further advantage of the present system is the provision of a retail data acquisition and tracking system which is compact, durable and inexpensive.

[0018] A distribution facility product data information display system comprises a base unit including

base communicator means adapted for interchange of remote data with at least one associated portable data terminal, the remote data including at least one of queries and product data,
means for receiving position data representative of a relative position of a portable data terminal relative to an associated product distribution facility, and
base processor means, including data storage, for generating response data in response to at least one of query data and position data; and

each of the at least one portable data terminal, including

remote communicator means adapted for remote data interchange with at least the base unit,
remote processor means for communicating query data to the base unit, and
a user interface adapted for selectively receiving data.

[0019] The consumer product data information display system may further include a means for selectively generating query data in accordance with indicia disposed on an associated product.

[0020] The consumer product data information display system may further comprise means for generating the position data in accordance with at least one of transponder data communicated from each of the at least one portable data terminal, and coordinate data associated with a plurality of spatially separated access points.

[0021] Preferably, the means for selectively generating query data includes a bar code reader.

[0022] Preferably, the means for selectively generating query data includes a touch panel.

[0023] Preferably, the means for receiving position data includes a plurality of transducers disposed throughout the distribution facility, each transducer being selectively placed in data communication with each portable data terminal in accordance with a relative proximity therebetween.

[0024] More preferably, the product data is comprised of hypertext mark-up language, and wherein in the user interface includes a graphical video display terminal adapted for selectively displaying a graphical representation of the product data via a web browser application.

[0025] The consumer product data information display system may further comprise means for fixedly securing the portable data terminal to an associated shopping cart.

[0026] A method of consumer product data information display comprises the steps of:

selectively receiving queries into at least one portable data terminal;
generating position data representative of a relative position of at least one portable data terminal relative to a distribution facility;
receiving queries, into the base unit, from at least one associated portable data terminal;
selectively accessing product data from a data storage in accordance with at least one of received query data and position data;
communicating product data accessed as a result of received query data from the base unit to a remote data terminal associated with such query data; and
selectively displaying product data on a video display of a portable data terminal.

[0027] The method of consumer product data information display may further comprise the step of selectively forming queries in accordance with product indicia.

[0028] Preferably, the step of selectively forming queries includes the step of accessing product indicia via at least one of a bar code reader and a touch panel.

[0029] The method of consumer product data infor-

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mation display may further comprise the steps of:

selectively accessing product data from the data storage in accordance with position data;
communicating product data accessed as a result of position data to the base unit to a selected remote data terminal associated with such position data; and
selectively displaying product data relating associated with position data on a video display of a portable data terminal to which such product data was communicated.

[0030] A consumer product data information display unit may comprise:

communicator means adapted for remote data interchange with at least an associated base unit;
a user interface adapted for selectively receiving queries and displaying product data;
means for selectively receiving product identification information associated with a particular product type:
means for selectively forming queries in accordance with received product identification information
means for communicating queries with the associated base unit; and
means for receiving product data accessed relating to a communicated query data from the associated base unit as a result of received query data.

[0031] The consumer product data information display unit may further comprise means adapted for communicating position data to the base unit, which position data is representative of a location of the data information display unit relative to a distribution facility.

[0032] The consumer product data information display system may further comprise means for generating the position data in accordance with information obtained from at least one of a plurality of transducers disposed throughout the distribution facility.

[0033] The consumer product data information display system may further comprise means for communicating product data accessed from the associated base unit as a result of position data communicated to the base unit from the data information display system; and

selectively displaying product data relating associated with position data on a video display of a portable data terminal to which such product data was communicated.

[0034] A consumer product data information search and retrieval system comprises

base communicator means adapted for remote data interchange with at least one associated portable data terminal, the remote data including at least one of queries and product data;
a data storage adapted for storing product data, which product data includes information corresponding to a plurality of products;
means for receiving queries from each associated portable data terminal;
means for selectively accessing product data from the data storage in accordance with received query data; and
means for communicating product data accessed as a result of a received query data to a remote data terminal associated with such query data.

[0035] The consumer product data information search and retrieval system may further comprising means adapted for communicating position data to the base unit, which position data is representative of a location of the at least one associated portable data terminal relative to a distribution facility.

[0036] The consumer product data information search and retrieval system may further comprising means for generating the position data in accordance with information obtained from at least one of a plurality of access points disposed throughout the distribution facility.

[0037] The consumer product data information search and retrieval system may further comprising means for storing the product data in hypertext mark-up language format.

[0038] A retail consumer product data information display system comprises a base unit including

base communicator means adapted for interchange remote data with at least one associated portable data terminal, the remote data including at least one of user queries and product data,
a data storage adapted for storing product data, which product data includes information corresponding to each of a plurality of retail products,
means for receiving queries from each associated portable data terminal;
means for selectively accessing product data from the data storage in accordance with a received query data, and
means for communicating product data accessed as a result of received query data to a remote data terminal associated with such query data; and

a portable data terminal, including

remote communicator means adapted for remote data interchange with at least the base unit,
a user interface adapted for selectively receiving user queries and displaying product data,
means adapted for receiving product identification information associated with a particular product type, and
means for selectively forming queries in accordance with received product identification informa-

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tion.

[0039] Preferably, the means for receiving product identification information includes a means for receiving product identification information from indicia disposed on an associated product.

[0040] A portable distribution facility product data information display system comprises

at least one portable data terminal, each including

remote communicator means adapted for remote data interchange with at least an associated base unit,
remote processor means for communicating query data to the base unit,
means adapted for selectively generating query data in accordance with indicia disposed on an associated product,
a user interface adapted for selectively receiving data from the associated base unit, and
means for adapted for providing position data to the associated base unit in accordance with at least one of transponder data communicated from each of the at least one portable data terminal, and coordinate data associated with a plurality of spatially separated access points.

[0041] Preferably, the means for selectively generating query data includes at least one of a touch pad and a bar code reader.

[0042] Yet a further advantage of the system is the provision of a product data acquisition and tracking system which allows for ease in data upgrades and maintenance by storing most relevant data at a single, centrally-disposed database.

[0043] Still other advantages and benefits of the invention will become apparent to those skilled in the art upon a reading and understanding of the following detailed description.

Brief Description of the Drawings

[0044] The invention may take physical form in certain parts and arrangements of parts, a preferred embodiment and method of which will be described in detail in this specification and illustrated in the accompanying drawings which form a part hereof, and wherein:

Figure 1 is a perspective view of a portion of a retail store utilizing the customer information system in accordance with this invention;
Figure 2 is a perspective view of the customer information terminal as mounted on the shopping cart with the dataform reader of the device being employed in a presentation mode;
Figure 3 is a view, partly in section and partly in elevation, of the customer information terminal of Figure 2;
Figure 4 is a view, partly in section and partly in top plan, of the retractable, tethered dataform reader of the customer information terminal of Figure 2;
Figure 5 is a schematic representation of selected electronic modules and circuitry of the customer information terminal of Figure 2;
Figure 6 is a flowchart representing processing steps of the customer information terminal of Figure 2 in connection with a shopping session at a retail store using the device;
Figure 7 is a representative introducing HTML page displayed on a touch sensitive display screen of the customer information terminal of Figure 2;
Figure 8 is a table of programs and data stored at the host computer of Figure 1;
Figure 9 is a flowchart representing processing steps of the host computer of Figure 1 in connection with verifying the validity of a customer ID and PIN;
Figure 10 is a flowchart representing processing steps at the host computer of Figure 1 in connection with the customer information terminal reading a bar code;
Figure 11 is a main menu HTML page displayed on the touch sensitive display screen of the portable data collection device of Figure 2 in connection with a shopping session;
Figure 12 is a representative generic confirmation HTML page displayed on the touch sensitive display screen of the portable data collection device of Figure 2 after an item's bar code dataform has been read;
Figure 13 is a flowchart representing processing steps of the portable data collection device of Figure 1 in connection with a help routine for aiding a customer find a desired item;
Figure 14 is a representative HTML page displayed on the touch sensitive display screen of the customer information terminal of Figure 2 in connection with a routine for providing a recipe using a selected food item;
Figure 15 is a flowchart representing processing steps of the host computer device of Figure 1 in connection with a routine for providing a recipe using a selected food item;
Figure 16 is a representative HTML page displayed on the touch sensitive display screen of the customer information terminal of Figure 2 in connection with a routine for checking out items selected for purchase;
Figure 17 is a representative HTML page displayed on the touch sensitive display screen of the customer information terminal of Figure 2 in connection with a help routine for aiding a customer find a desired item;
Figure 18 is a representative screen layout displayed on the touch sensitive display screen of the customer information terminal of Figure 2 in con-

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nection with a routine for permitting a customer to order a prepared item during a shopping session;
Figure 19 is a flowchart representing processing steps of the customer information terminal of Figure 2 in connection with a routine for checking out items selected for purchase; and
Figure 20 is a flowchart representing processing steps of the host computer of Figure 1 in connection with a routine for adding or removing an item from the customer's electronic receipt.

Detailed Description of the Preferred Embodiment

[0045] Referring now to the drawings wherein the showings are for the purposes of illustrating the preferred embodiment of the invention only and not for purposes of limiting same, the customer information terminal system of this invention is represented in Figure 1. The system generally comprises a customer information terminal 10 mounted on a shopping cart 18. The terminal is communicatively linked to a host computer by a wireless LAN 88. A transceiver in the terminal communicates with an transceiver in one of a plurality of access points 54 and 56, which, in turn, communicates with the host 58 via a hard wired network topology and network operating system ("NOS") suitably implemented on an Ethernet or token ring local area network ("LAN") 78. In the preferred embodiment, data communication between the shopping cart 18 and the LAN 88 is accomplished through a radio frequency (RF) link. However, it will be readily appreciated that any medium to short distance data communication scheme, such as infrared ("IR"), are suitably employed.

[0046] The customer terminal 10 generally functions as a TCP/IP web browser which alternatively link requests data at web sites stored at the host computer 58 and, after receiving the data, displays hyper-text markup language ("HTML") web pages to the customer on display 14. Using a HTML browser format advantageously provides flexibility on the particular hardware implemented in the customer terminal 10. For example, powerful HTML browsers exist under UNIX, WINDOWS, OS/2, and MACINTOSH environments. Thus, there is no need to engage in a costly design of a property hardware system.

[0047] Web pages displayable on the terminal 10 advantageously provided, include information pertinent to the customer's shopping experience. The customer terminal 10 generates the link requests based on at least one of: (a) the current web page displayed to the customer, (b) a product identification code as read by bar code reader 22, (c) customer manual data input via interactive touch display screen 14, and (d) location in the store as determined a transceiver 164. Although, as with the transceiver noted above, any suitable data transmission format may be used, the preferred embodiment employs an infrared IR receiver 164 detecting a unique signature data pattern transmitted by IR transceivers or transmitters 166 and 168 located at fixed locations in the store. Each of these systems will be discussed in more detail.

[0048] The customer terminal 10 also includes a high capacity battery 70 which is mounted in a case disposed on a bottom rack 72 of the shopping cart 18. The battery 70 preferably uses lead-acid technology because of its low cost, high energy capacity and lack of memory effect. The weight associated with a lead-acid battery is not a concern because it is mounted on the cart 18. A typical 6 volt, three cell lead-acid battery, such as the type used on a motorcycle, has an energy capacity sufficient to power the device 10 for a time period in excess of 24 hours. A power lead 74 connects the battery 70 to power circuitry 76 (shown schematically in Figure 5) in the housing 12 which controls converting battery power to appropriate electrical parameters for operating the various components of terminal 10. The power circuitry 76 also includes charging circuitry and an external power supply port for connecting an external power supply for charging the battery. It will be appreciated that other suitable power systems, such as a photovoltaic system or hybridized power system may also advantageously be employed. Further, alternative shopping carts, such as those motor-drive carts for the physically impaired, will have their own power plant which can be utilized to supply sufficient power for the customer terminal 10.

[0049] The dataform reading-assembly 22 is refractively tethered or attached to the housing 12 with an electrical cable 24. The dataform reader 22 is adapted to operate in at least two modes: a) a hand held mode; and b) a presentation mode. The hand held mode of operation is represented in Figure 2, wherein the reader 22 is removed by the customer from an opening 36 in a side 38 of the housing 12. When supported in the opening 36, the reader 22 extends slightly beyond the side 38 so that the customer can easily grasp a front portion of the reader and slide it out of the opening. The customer moves the reader 22 to, a dataform 30 of an item so desired to be purchases or priced by the customer. The customer activates a suitable selector, such as by depressing a trigger 40, to actuate an imaging assembly 42 and an illumination assembly 44 of the reader 22. The illumination assembly 44 advantageously provides a uniform illumination pattern that substantially corresponds to an imaging area or field of view 46 of the imaging assembly 42 and additionally generates at more intense cross hair illumination pattern 48 to aid the customer in positioning the reader 22 so that the dataform 30 of an item 50 is properly within the imaging area of the reader. The uniform illumination pattern and cross hair aiming pattern are rapidly alternated between off and on states, such that one is off while the other is on. This alternation of illumination pattern avoids the difficulty of having to decode a captured dataform image which has an intense cross hair illumination pattern imposed thereon. The alternation of the illumination and cross hair patterns is rapid enough that it appears to the

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customer that the cross hair aiming pattern is continuously on.

[0050] While keeping the trigger 40 depressed, the customer aims the cross hair pattern 48 at a center of the dataform 30. The customer moves the reader 22 toward the item 50 until an audible tone or "beep" is emitted by a speaker 130 indicating that the dataform 30 has been successfully read and decoded. The item's price and product name or description and product size will appear on the display 14 (this functionality will be discussed in more detail later). After the "beep" is heard, the reader 22 is returned to the opening 36 and slid into the housing 12.

[0051] In the presentation mode of operation shown in Figure 1 and 4, the reader 22 is disposed in the housing opening 36 and the customer reads a dataform 30 affixed to an item 50 by moving the item to the reader 22. While the reader 22 remains in the housing opening 36, a magnetic switch 158 enclosed in a back portion of a reader module housing 142 of the reader 22 is turned on by a magnet 160 positioned in the opening 36 when the reader is positioned in the opening. Actuation of the magnetic switch 158 causes the imaging assembly 42 and the illumination assembly 44 to be actuated. Thus, the reader 22 is continuously ready to read a dataform when it is disposed in the opening 36. When a "beep" is heard, the customer knows that the dataform 30 has been successfully imaged and decoded. In this presentation mode, the illumination pattern is continuously on and the cross hair illumination pattern is deactivated since properly "aiming" the reader 22 is not a concern. The hand held mode is advantageously used when an item on a shelf is too large or too clumsy to move from the shelf or if the customer just wishes to check a price without removing the item from the shelf. The presentation mode is advantageously employed when a selected item is smaller and more easily handled.

[0052] Figure 4 is a cut-away view of the reader 22 and a portion of the device 10 in the region of the opening 36 showing details of a recoil or cable retraction mechanism 138 of the dataform reader 22. The reader module housing 142 is a modular unit that includes a top half and a mating bottom half. Only the bottom half of the reader housing is shown in Figure 4 so that the internal components of the reader 22 are visible in the figure. The reader 22 is connected to the housing 12 with the cable 24. The cable 24 includes the plurality of conductors 140 for: a) coupling operating power 26 to the reader 22; b) coupling the data signal 28 from the reader 22 to the processor 32; and c) coupling control signals from a processor 32 on control board 33 (Figure 3) to the reader 22. The cable 24 is secured to the module housing 142 of the reader with a clamping grommet 144 to prevent the reader 22 from being physically separated from the cable 24. To further secure the reader 22 to the cable 24, a knot (not shown) may be tied in the cable just inside the reader housing 142. The plurality of conductors 140 are electrically coupled to a printed circuit board 146 within the reader housing 142 by a connector 148.

[0053] The housing 12 is advantageously weatherproofed to accommodate its being periodically exposed to the elements during periods of exposure, such as while in a parking lot. Within the housing 12, the cable 24 is wrapped around a recoil spool 150. The recoil spool 150 spins about a center pin 152 of the spool. The pin 152 is a hollow cylinder such that the cable 24 may be threaded through the pin 152 and connected to circuitry within the housing 12. A spirally wound bias spring 154 is secured to the pin 152 at the center of the recoil spool 150 and to the spring tab 156 at that perimeter of the recoil spool 150 to bias the spool in a counter clockwise direction (as viewed in Figure 4). This arrangement keeps the cable 24 under tension when the reader 22 is removed from the housing opening 20. The edge formed by the housing wall 162 and the side wall 38 is rounded to avoid wearing an outer surface of the cable 24.

[0054] The reader 22 preferably utilizes a two-dimensional imaging assembly. The imaging assembly 42 includes a two-dimensional photo sensor array 170 and an optic assembly supported in a lens housing or shroud 172 for focusing an image of the dataform 30 in the field of view 46 onto the photo sensor array 170. Conventionally available circuitry on printed circuit boards 174, 176, and 146 operate to sequentially read out charges accumulating on photosensors of the photo sensor array 170, generate an analog composite video signal, store a digital representation of a captured image, and decode the captured image to generate the decoded data signal 28. At least a portion of this image capture, image processing, and decoding circuitry may be implemented in code executed by processor 120 on the printed circuit board 146.

[0055] The illumination assembly 44 of the reader 22 includes four sets of four illumination light emitting diodes ("LEDs") 180, which are surface mounted in the preferred embodiment and positioned on a printed circuit board 182 (only two sets of the four sets of four illumination LEDs are seen in Figure 4). The illumination LEDs direct illumination through corresponding aligned lens portions 181 of a lens array 184 towards the imaging field of view 46. Two targeting LEDs 186, 188 operate to direct illumination through aligned apertures in board 182 and through aligned lens portion 189 in the lens array 184 and generate the cross hair illumination pattern in the field of view 46 to assist the operator in relatively positioning the reader 22 and the dataform 30. As noted above, the cross hair illumination pattern is only generated when the reader 22 is used in the hand held mode. A more detailed description of the components of a suitable two dimensional imaging assembly for a hand held dataform reader and its operation can be found in U.S. Patent Application Serial No. 08/609,344, filed March 1, 1996, and entitled PORTABLE DATA COLLECTION DEVICE WITH LED TARGETING AND ILLUMINATION ASSEMBLY, the con-

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tents of which are incorporated herein in the entirety by reference.

[0056] Referring to Figure 3, a magnetic stripe leader 60 is suitably molded into an upper surface 125 of the housing 12. The stripe reader 60 includes a slotted opening 61a in the upper surface and includes a stripe sensor and reader 61b disposed along the opening. Appropriate magnetic stripe decoding circuitry is mounted on the control board 33. Magnetic stripe sensors and decoding circuitry are commonly available.

[0057] A printing assembly 62, comprised of a thermal printer in the preferred embodiment, which functions to print out a paper receipt 63 for the customer at the completion of shopping session or a recipe for an item. The printing assembly 62 discharges the receipt or recipe printout through a slot shaped opening 32 in an upright front surface 66 of the housing 12. The thermal printer assembly 62 includes a thermal printhead 90 and an opposing platen 92 to position the paper 63 against the printhead 90. A motor 94 drives a feed roller 96. The feed roller 96 operates in conjunction with an idler roller 98 to draw paper 63 from a paper roll 100 past the printhead 90 and feed the receipt or recipe printout 63 out of the slot shaped opening 64 in the housing 12. Printer driver circuitry 101 for operating the printer assembly components is mounted on the control and decoder printed circuit board 33 disposed in the housing 12. At least a portion of the circuitry 101 is suitably embodied in code stored in a memory 106 represented by a memory chip on the control printed circuit board 33 and executed by the processor 32, both on printed circuitry board 33 thermal printing assemblies including these components are commonly available. It should be appreciated that the cost of the printer could be saved by placing common printers at chosen locations within the store. The terminal 10 would transmit data via the RF network 78 to a chosen common printer. The common printer will typically be chosen based on the location of the terminal within the store as determined by the location detection system.

[0058] The user interactive display screen 14 suitably includes a liquid crystal display ("LCD") display panel 110 and an overlying touch sensitive resistive contact panel 112. However, it will be appreciated that any variety of video display terminals, such as thin film transistor (active or passive), may suitably be used. Circuitry for operating the display panel 110 and the contact panel 112 includes LCD driver circuitry 114 and contact panel driver circuitry 116. Additionally, the circuitry 114, 116 for operating the LCD display and contact panels 110, 112 may, at least in part, be implemented in software stored in the memory 106 and executed by the processor 32.

[0059] The housing 12 also supports the speaker 130 which is mounted behind a grated opening 132 in the housing 12. The speaker 130 is driven by audio indicator driver circuitry 134 mounted on the control and decoder board 33 and provides audio feedback suitably in the form of a 1/2 second "beep" to the customer to indicate a successful bar code dataform read and decode. The terminal 10 is secured to the shopping cart handle 16 by a clamping assembly which clamps the housing 12 to the cart pushing handle 16. The clamping assembly includes adjustable clamp 80 and an accurate clamping surface 82 of the housing 12. Two sets of two threaded bolts 84, 86 (only one set of two threaded bolts can be seen in Figure 3) suitably extend between the clamp 80 and threaded openings in the housing 12 to secure the adjustable clamp 82 to the housing 12. When the two sets of threaded bolts 84, 86 are tightened, the housing 12 secured to the pushing handle 16 of the cart 18.

[0060] Referring again to Figure 1, in the preferred embodiment the customer terminal 10 includes an RF transceiver for communication with a host computer 58 via a wireless local area network. Each access point 54 and 56, includes an RF transceiver for wireless communication with a customer terminal 10 located within the cell. An appropriate access point is the Aironet 640 and appropriate RF circuity for customer terminal 10 includes the Aironet 025, both available from Aironet Wireless Communications, Inc. of Akron, Ohio. Other acceptable wireless networks include any spread spectrum networks operating in accordance with IEEE 802.11 Standard.

[0061] Referring to Figure 3, the spread spectrum radio communications circuitry 118 may be embodied in one or more IC chips mounted on the printed circuit board 33. Alternatively, the spread spectrum communications circuitry 18 may lie implemented on a separate printed circuit board with a PCMCIA interface and secured to the printed circuit board 33 through a PCMCIA standard slot interface. An antenna lead 122 connects the communications circuitry to an antenna mast 124 extending through an opening in the upper surface 125 of the housing 12. Alternatively, the antenna mast is suitably disposed inside the housing.

[0062] Referring yet again to Figure 1, an infrared receiver 164 is located on the top portion of the upper surface of the customer information terminal 10. The receiver detects the signature illumination pattern generated by each of a plurality of infrared transmitters 166 and 168 positioned throughout the store. It is anticipated that these transmitters 166 and 168 will be placed on top shelving or in the ceiling such that the signature pattern is detectable only within a predetermined area of the store 174 and 176. Detection of a particular signature pattern indicates that the terminal is within the predetermined zone of the store. Each emitter continually modulates the IR illumination source on and off in a distinctive 1/0 pattern. The infrared receiver includes a photo detector which generates an analog waveform in accordance with the distinctive illumination pattern which, based on thresholding, can easily be decoded into the signature pattern of ones and zeros in the IR receiver driver 165. Alternatively, any position locator, such as a transponder based system, may suitably be substituted for the above-detailed zone-based system and still ac-

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complish the position detection.

Operation of the Terminal Unit

[0063] Referring to Figure 6, the terminal operates as a TCP/IP web browser. When the shopping cart terminal 10 is first powered, a default page 302 (Figure 7) is requested from the host and, after received from the host is displayed on the screen at step 318. Typically the default page will be a welcome form page 302 and will graphically appear as Figure 7.

[0064] This page includes fields 304 and 306, virtual button 308 and 12 other buttons labeled 0-9, left arrow and right arrow, indicated generally at 310. By including executable code in the HTML form page (using Sun Micro Systems Java programming code for example), each of these buttons, when activated by the user, functions as a virtual keypad for manually entering a customer ID number. Alternatively, the operator may enter his or her customer ID number by swiping the magnetic stripe on an ID card. The magnetic strip reader circuitry decodes the strip and enters it into field using typical keyboard wedge emulation routines. Alternatively, the bar code reader may be used to read a bar code on an ID card, decode it, and enter is into the field using keyboard wedge emulation routines. The customer's PIN number is entered through the virtual keypad. Activating the enter button 308 calls a link defined in the HTML page at step 320, Figure 6. For security, the transmission of the customer ID number and the PIN number may be encrypted using standard public key encryption techniques. The link is a TCP/IP data packet addressed to the host, and when received by the host, causes the server to launch a customer verification program stored on the server. The program verifies the customer ID number and PIN in fields 304 and 306. In response to the link request, the terminal will receive a new HTML page selected by the customer verification program on the server at 322. The returning HTML page may be one of either an invalid ID page or the main menu page. The invalid ID page will typically include HTML code to self generate a link request for the welcome page 302 after a predetermined period of time. A typical main menu HTML page is shown in Figure 11. It includes a plurality of labeled buttons 208-214 which, if user activated, generates a link request for a selected sub menu page corresponding to the selected button at 320. Each of the sub menu pages which, could be received at 322 will be discussed in more detail later.

[0065] At step 324 the system determines whether a bar code has been read. The bar code reading system typically will be connected to the processor through a data connection, such as a serial port which generates a software interrupt when a bar code has been successfully decoded. The interrupt triggers the processor to transmit a link request to the server at step 326. The link request is a TCP/IP data packet which includes the decoded data and instructions to the server to launch a program to return an HTML confirmation page associated with the product. Step 322 represents receipt of the page. Typically the return page will be a generic page which enables the customer to verify his or her desire to purchase the product. Alternatively, the merchant may wish to use verification pages which include advertisements for promotional products when the bar code for particular products are read. These are referred to as product specific verification pages. A typical generic verification page appears in Figure 12. The page includes field 222 which displays the product description and price. The page also includes buttons 224, 226, and 228 which, if activated, cause the HTML page to transmit a link request at 320 which launches a host program to either add the product to the customer purchase list, remove the product from the customer purchase list or to return to the main menu ignoring the read, respectively. Additionally, the page includes virtual buttons 232, 234, 236, and 238 which, if activated, cause the page to generate a link request to a sub menu page.

[0066] At step 328, the system determines whether the terminal has moved to a new location in the store. The infrared receiver will typically be connected to the processor through a serial port which generates a software interrupt when the infrared receiver detects that it has moved to a new zone. The interrupt triggers the processor to transmit a link request at step 330. The request is a TCP/IP packed addressed to the server which includes the new location and instructions to launch a program on the server which determines whether to transmit a new HTML page to the terminal or whether to return the same page as currently displayed (customer sees no change). Step 322 represents receipt. Typically a new page will be an advertisement page which is associated with a product near the location of the terminal.

[0067] Alternatively, the location detection system may be an RF system wherein a radio transceiver in a terminal interrogates and detects return signals from passive short range RF ID tags.

[0068] Step 332 represents checking whether the session has ended which typically would only be represented by shutdown of the terminal to end the flowchart at 334. If the session has not ended at 332, the system merely loops back to 320 to continue the iterative process of sending link requests and receiving HTML web pages.

[0069] It should be appreciated that the checkout routine does not end the system, but is merely a link request from the main menu at step 320. Furthermore, after a customer has successfully checked out, return to the introductory page for the next customer is also merely a link request at 320.

Server Operation

[0070] Figure 8 is a table of a suitable setup of the server. The server includes storage of HTML Web pag-

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es, databases and programs launchable by customer terminal link requests. If the server receives a link request from a client for a specific page, the server merely returns the requested page. Alternatively, if the link request launches a program, the server executes the program and returns an page as required by the program.

[0071] As can be seen from the foregoing, the terminal basically generates link requests and receives return data. All programs associated with the system for interacting with the customer are stored and run on the server. These programs will be discussed with reference to the flowcharts shown in Figures 9, 10, 13, 15, 19, and 20.

[0072] Figure 9 is a flowchart showing operation of the customer verification program at the server. As previously discussed with reference to Figure 7, activation of virtual button 308 causes the terminal to send a link request to the host computer which includes the customer ID number, the PIN number and instructions to launch the customer verification program. The program starts at 190 which represents receipt of the link request from the customer terminal. At step 192, the server looks up the customer ID number in the database and, at 194, checks whether the ID number and PIN combination is valid. If it is valid, the server returns the menu page to the terminal, Figure 11, at 196. Alternatively, if the number is invalid, the server returns the invalid ID to the terminal page at 198. The program ends at 200.

[0073] As previously discussed, the customer can use the bar code reader to read a bar code which, in turn, causes the terminal to transmit a link request to launch a bar code read program at the host. Figure 10 is a flowchart showing operation of the bar code read program. The program starts at 290 which represents receipt of link request from the customer terminal. At 292, the system looks up the price and description corresponding to the UPC code in the price and description databases. At 294, the system determines whether the confirmation page to be associated with the particular product is generic or custom. Typically this will include looking up the UPC code in a list of products to associate with a custom confirmation page. If a generic page is used, the price and description are inserted into the appropriate fields of the generic page and the page is returned to the customer terminal at 296. Alternatively, of a custom page is to be used, it is returned to the customer terminal at 298 and the system ends at 300.

[0074] Figure 12 shows a sample of a generic confirmation page 120. The page includes message field 222 which includes a description of the product and its price. Message field 230 may be used to display other information about the product. For example, if the product is a tobacco product, the message field 230 may display the Surgeon General's warning. The page 220 includes two virtual buttons 224 and 226, which if activated, cause the terminal to transmit a link requests to the host which will launch the running total program at the server. The running total program will add or remove the item from the customer's running receipt as required by the link request. Virtual button 228 causes the terminal to transmit a link request for the main menu HTML page. The page 220 also includes virtual buttons 232, 234, and 236, which if activated, cause the terminal to transmit a link request to the host or a particular HTML page associated with a product coupon, product information, or alternate product information, respectively. Virtual button 238, if activated, causes the terminal to transmit a link request which launches the recipe search program on the host. A custom confirmation page would typically include the same virtual buttons, but may additionally include custom graphics related to the scanned product.

[0075] Figure 20 is a flowchart representing the processing steps at the host computer which add or remove the item from the customer's running total. The program starts at step 380 which represents receipt of the link request form the customer terminal. The link request is a TCP/IP data packet addressed to the host which includes instructions to launch the running total program and a data filed indicating whether the item is to be added or removed from the customer's running total. Step 382 represents the server determining based on the data field whether to add or remove the item from the customer's running total. If the item is to be added, the host adds the item to the running receipt at 384 and returns a main menu page to the customer at 388 with updated running receipt totals in the appropriate fields. Alternatively, if the item is to be removed at step 382, the host removes the item at 386 and returns an updated main menu page at 388. The program ends at 390.

[0076] When the customer has finished shopping, the customer activates the checkout button on the main menu. Activation of the button causes the terminal to generate a link request for the checkout form page which is graphically shown at 250 in Figure 16.

[0077] The checkout form page 250 includes a visual representation of the customer's receipt in field 252. Virtual buttons with arrows 254 and 256 are used by the customer to scroll the receipt for viewing. The page includes virtual button 258 which, if activated by the customer, aborts the checkout routine by causing the terminal to generate a link request for the main menu page. Virtual button 260 is activated by the customer to indicate the customer's desire to pay cash which causes the terminal to transmit a link request to the host to launch the cash checkout program. Virtual buttons 262 and 264 are activated by the customer to indicate the customer's desire to pay with a debit or credit card, respectively. Activation of these buttons cause the terminal to transmit a link request to the host to launch the debit/credit checkout program.

[0078] Figure 19a is a flowchart representing the cash checkout program on the server. The program starts at step 400 which represents receipt of the link request from the customer terminal. At step 402 the server returns a page to the customer terminal which instructs the customer to proceed to the cashier. Step 404 repre-

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sents receipt of confirmation from the cashier that the sale is complete. The cashier will typically have a cashier's terminal communicatively coupled to the host via the network. After receipt of the cashier's confirmation, the server will send an HTML page with a thank you message to the customer at 406 and the program ends at 408. Typically the thank you page will include a timer to generate a link request for the welcome page after a predetermined period of time. This positions the terminal for the next customer.

[0079] Figure 19b is a flowchart representing the debit/credit checkout program on the server. The program starts at step 410 which represents receipt of the link request from the customer terminal. At step 412 the server returns an HTML page with instructions to the customer to swipe the magnetic strip on his or her credit or debit card. Step 414 represents receipt of the credit or debit card number from the customer terminal. At step 416 the program sends a confirmation page to the customer terminal. The confirmation page includes virtual buttons for verifying the amount of the sale and entering a PIN number as appropriate for a debit card. Step 418 represents receipt of a data packet from the customer terminal which includes the PIN number and the customer's confirmation. Step 420 represents obtaining card authorization from the appropriate card issuing authority. After authorization is obtained, receipt data is transmitted to the customer terminal along with a thank you message. The program ends at 424.

[0080] As previously discussed, various customer assistance routines can be requested by the customer which include a recipe search routine, a location assistance routine and order of specially prepared items.

[0081] Figure 15 is a flowchart of operation of the recipe search program on the server. The customer terminal can be activated to generate a link request to launch this program from either of the main menu page 202 (Figure 11) or the confirmation page 220 (Figure 12). The program starts at step 336 which represents receipt of the link request. Step 338 represents return of the recipe search form page to the customer information terminal. Figure 14 shows a sample recipe search form page 360 for obtaining search terms. The page 360 includes a plurality of virtual buttons A-Z plus "space" (designated generally at 362) which are supported by executable code such as Sun Microsystems Java which, when activated, operate to enter the designated letter into field 364. The operator uses the virtual buttons to enter a search term. It should be appreciated that if the search program is requested from the confirmation page (220 or Figure 12), the product description may be automatically placed in field 364 and the virtual buttons are used for editing.

[0082] After entering the appropriate search term, the user activates either of virtual button 366 or 368 to generate a link request. The link request is a TCP/IP packet which includes the search term, instructions to launch the search and a field indicating whether the search is by title or ingredient. Step 340 represents determining whether the search is for an ingredient search or a title search. If an ingredient search, the host searches the recipe database at step 342 and returns the recipe search page with a list of matching recipes in scrollable field 370. at step 346. Alternatively, if a title word search, the host searches the recipe database at step 344 and returns the recipe search page with the list of matching recipes in scrollable field 370 at step 346.

[0083] Referring again to Figure 14, the customer uses the arrow keys 372 and 374 to move a highlight bar 378 to highlight the desired recipe in the scrollable field. Virtual button 378, if activated, causes the terminal to generate a link request for the HTML page with the recipe printed thereon.

[0084] Referring again to Figure 15, step 348 represents receipt of the link request from the terminal for a specific recipe. Step 350 represents sending the recipe from the database to the customer terminal. The host program then ends at 352.

[0085] The HTML page which includes the recipe will typically include a virtual button which, if activated, causes the printer to print a hard copy of the recipe for the customer. Furthermore, the page will include a virtual button which, if activated, causes the terminal to make a link request to the main menu page or the confirmation page which was originally used to initiate the recipe search.

[0086] Figure 13 is a flowchart which represents processing steps at the host computer when the customer elects the location assistance routine by activating virtual button 208 from the main menu 202 of Figure 11. The program starts at step 426 which represents receipt of the link request from the customer terminal. Step 128 represents return of the search initiation page to the customer terminal.

[0087] Figure 17 shows a representation of the search initiation page 270. The page 270 includes field 284 into which the customer enters the name of the desired product. The customer uses virtual buttons 280 to enter the product name. Simultaneously, all of the products available in the store are listed in scroll box 272. A highlight bar 278 will be positioned over the first item in the list which matches the letters entered by the customer. The customer in addition to entering the product name via the virtual keyboard 280 can also move the highlight bar 278 over the list by using virtual buttons 274 and 276. When the customer has positioned highlight bar 278 over the desired item, virtual button 282 can be activated to initiate a link request for an HTML page which shows the items location in the store.

[0088] Returning to Figure 13, step 430 represents receipt of a link request which includes the selected item at the host. At step 432, the host looks up the items location in a database and at step 434, selects an page which includes a map of the portion of the store that includes the desired product. Step 36 represents transmission of the map page to the customer terminal and

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the program ends at step 438.

[0089] As previously indicated, virtual button 212 of the main menu 202 of Figure 11, may be activated by the customer to initiate programs for ordering prepared items. Activation of button 212 will generate a link request for a sub menu page which will list the types of item which may be ordered. It is anticipated that such items may include floral products, butcher shop products, bakery products or deli products. Each sub routine will typically include a series of HTML pages which interact with the customer to order a selected item.

[0090] The invention has been described with reference to the preferred embodiment. Obviously, modifications and alterations will occur to others upon a reading and understanding of this specification. It is intended to include all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

Claims

1. A retail consumer product information display system, comprising a portable terminal (10) accessible to a retail consumer at a retail outlet and at least one remotely located base unit (58),

 wherein said at least one remotely located base unit (58) includes a database of product information and means for retrieving said product information from said database in response to a request,

 and wherein said terminal (10) includes: a transceiver adapted for transmitting said request to said base unit (58) and receiving said product information from said base unit (58); a visual display (14) for displaying said product information to the retail consumer; an imager (22) having a two-dimensional photo-sensor array (170); means for storing a digital representation of an image sensed by said photo-sensor array (170); and means for generating said request from said digital representation.

2. A system according to claim 1, wherein said request comprises a decoded data signal representative of a dataform from a dataform comprised in said image.

3. A shopping cart (18) having the retail consumer product information display system of claim 1 or claim 2 mounted thereon.

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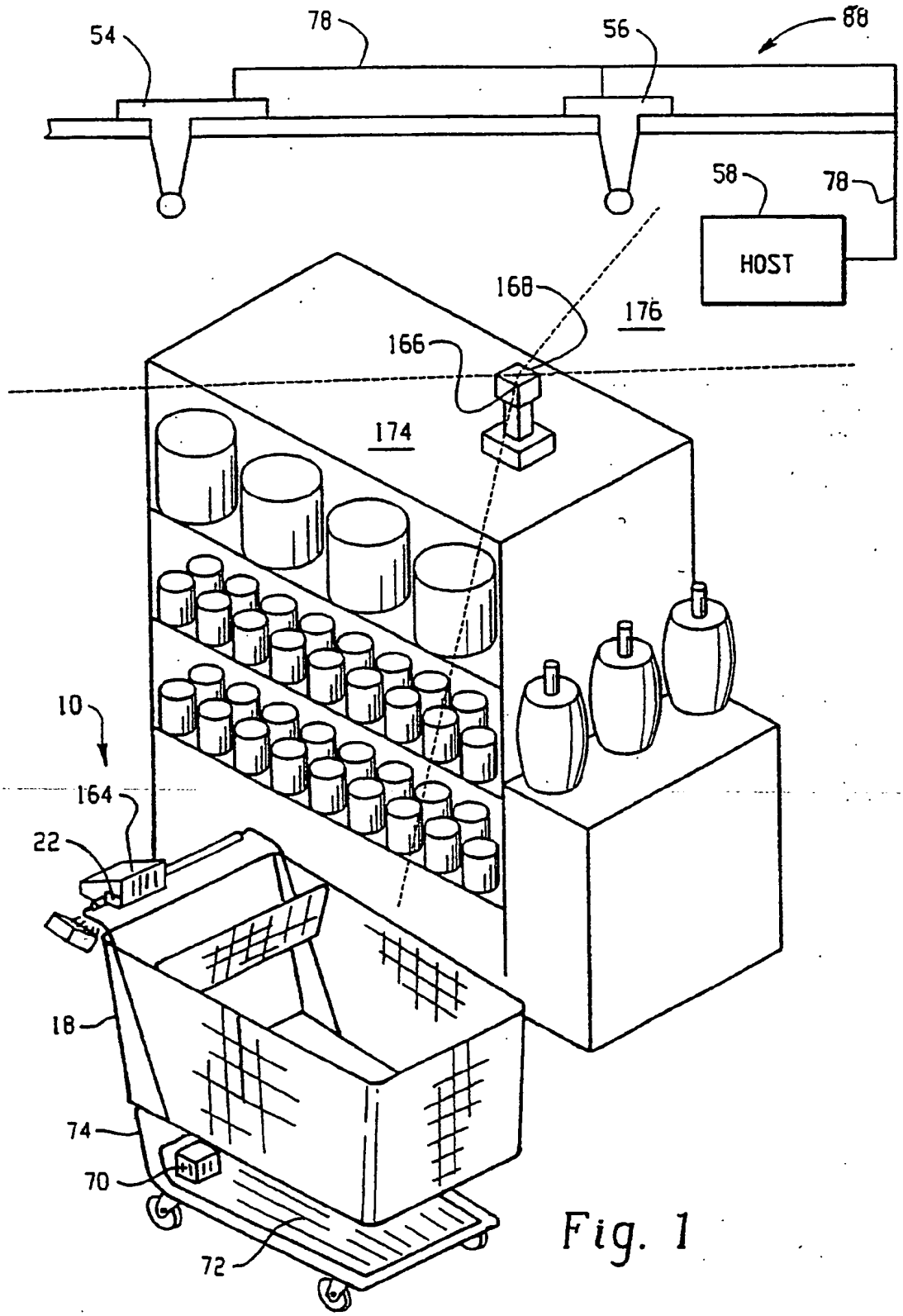


Fig. 1

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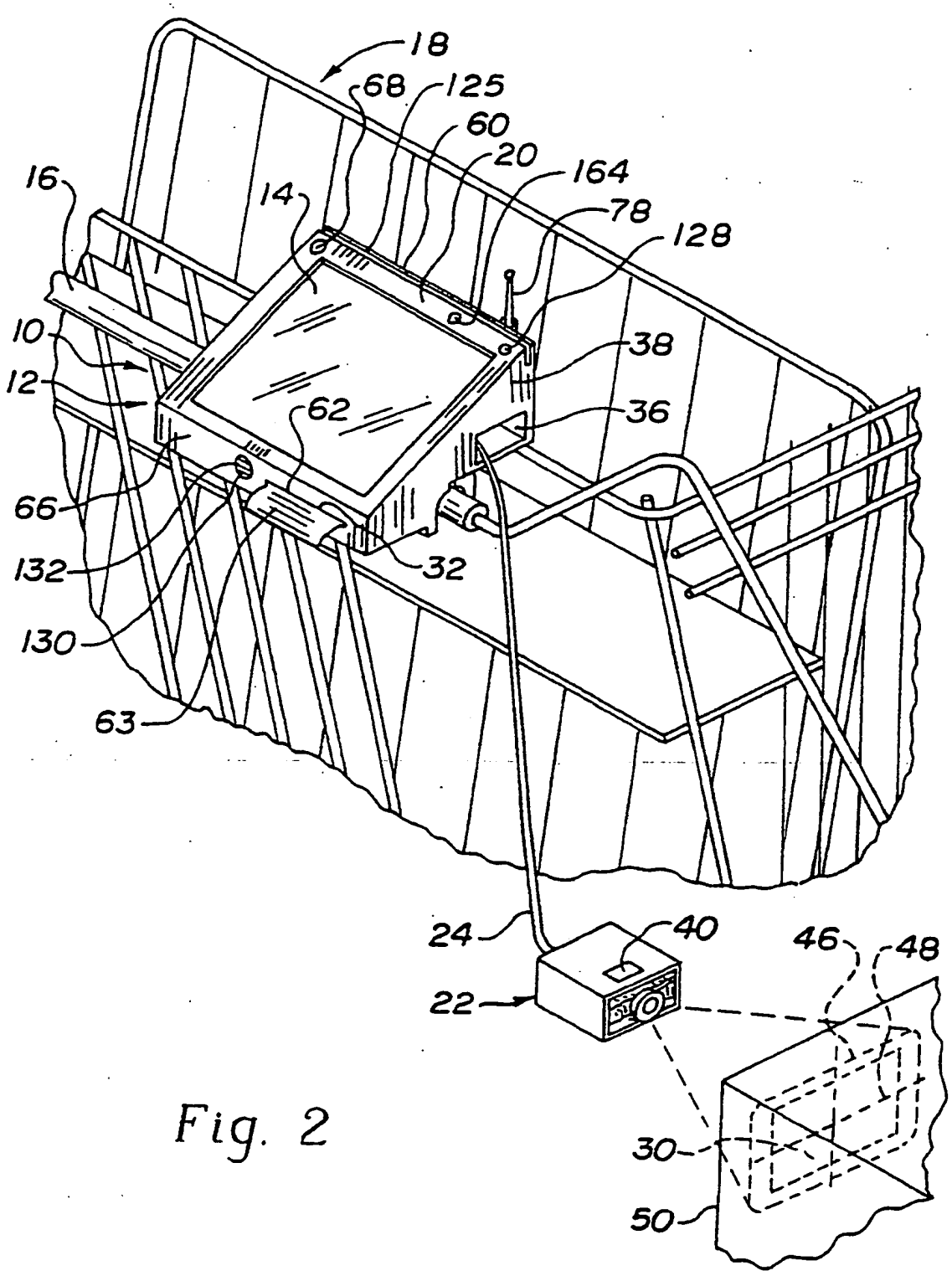

18
68
125
60
20
164
78
128
16
14
10
12
38
36
62
66
132
130
63
32
24
40
46
48
22
30
50

Fig. 2

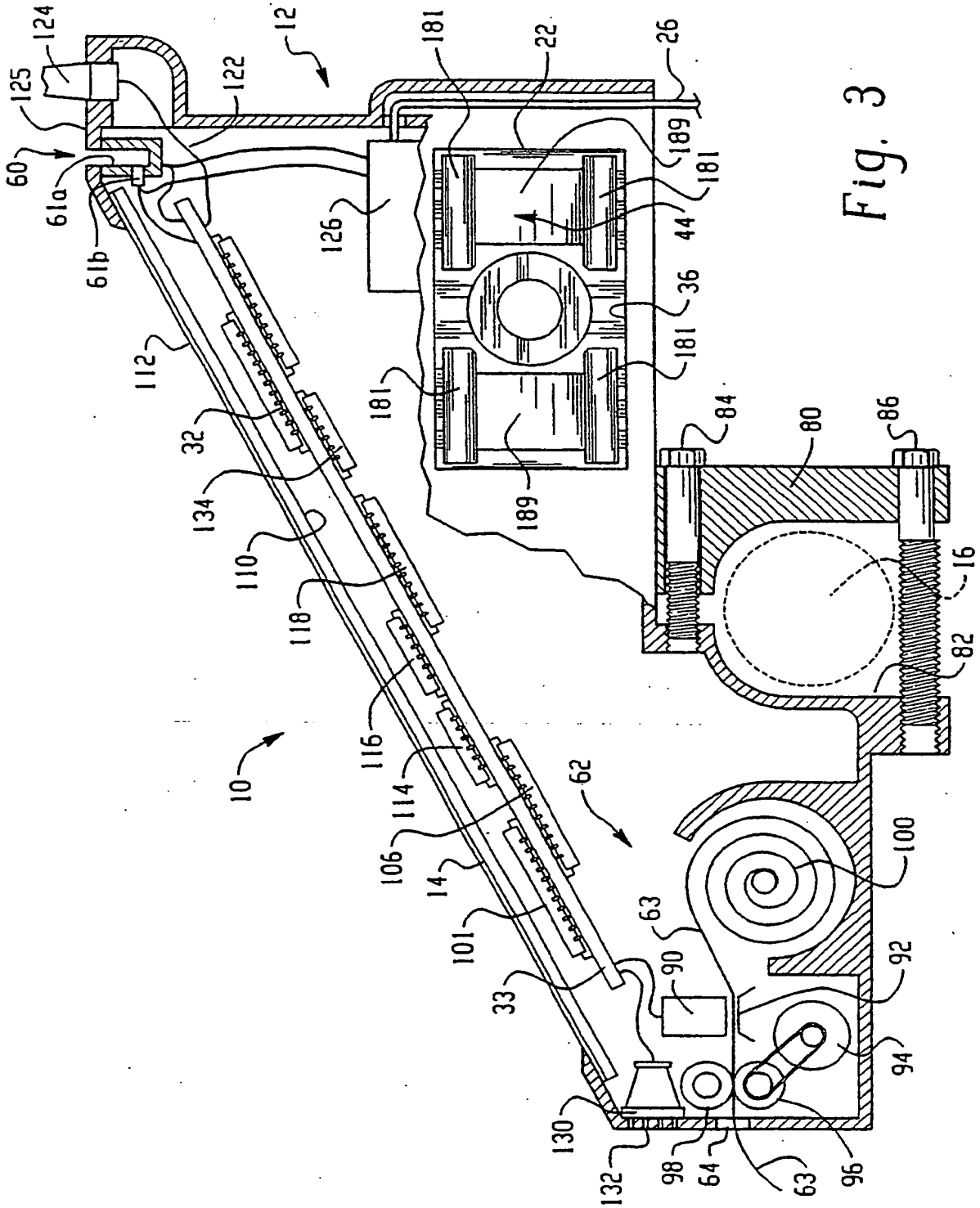


Fig. 3

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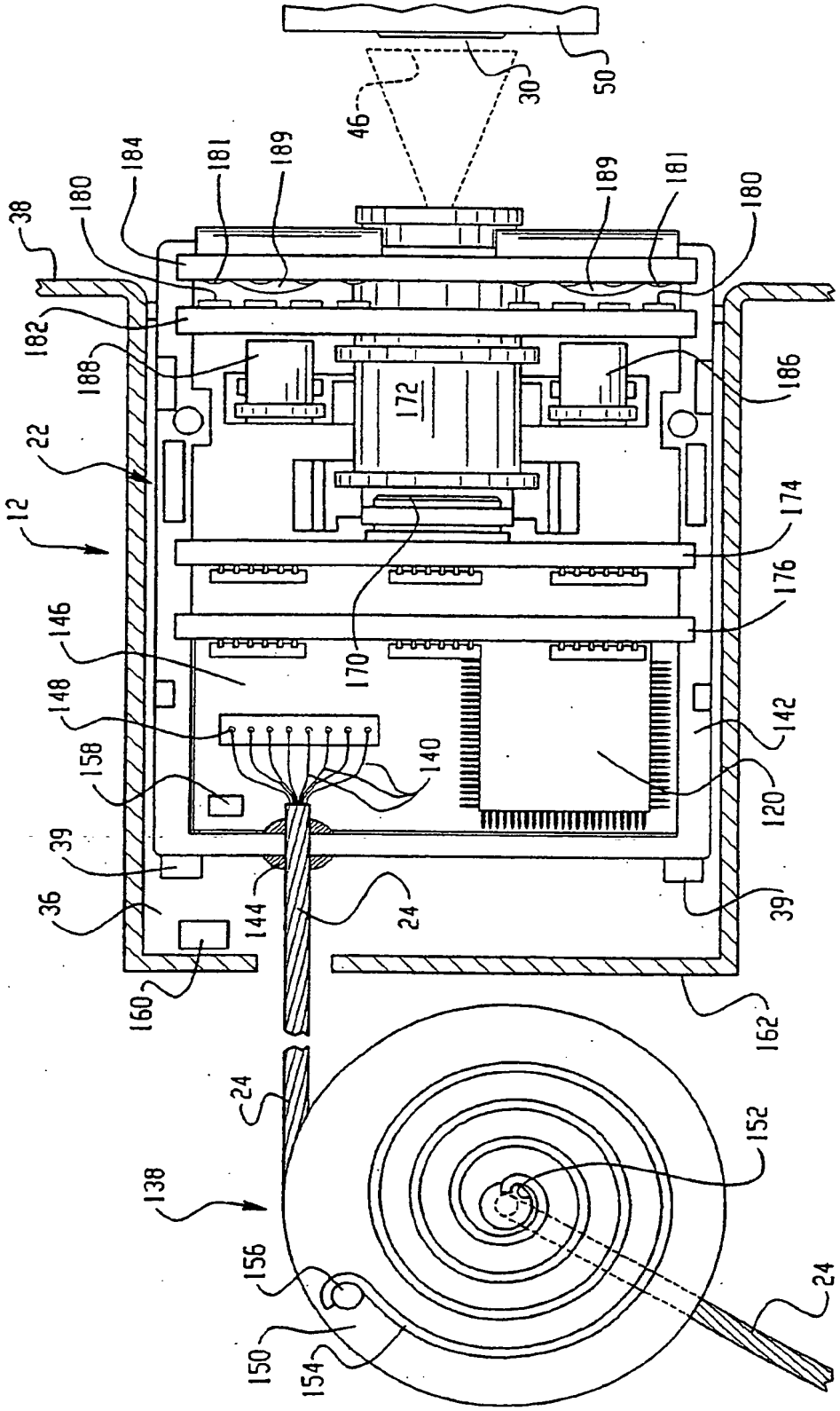


Fig. 4

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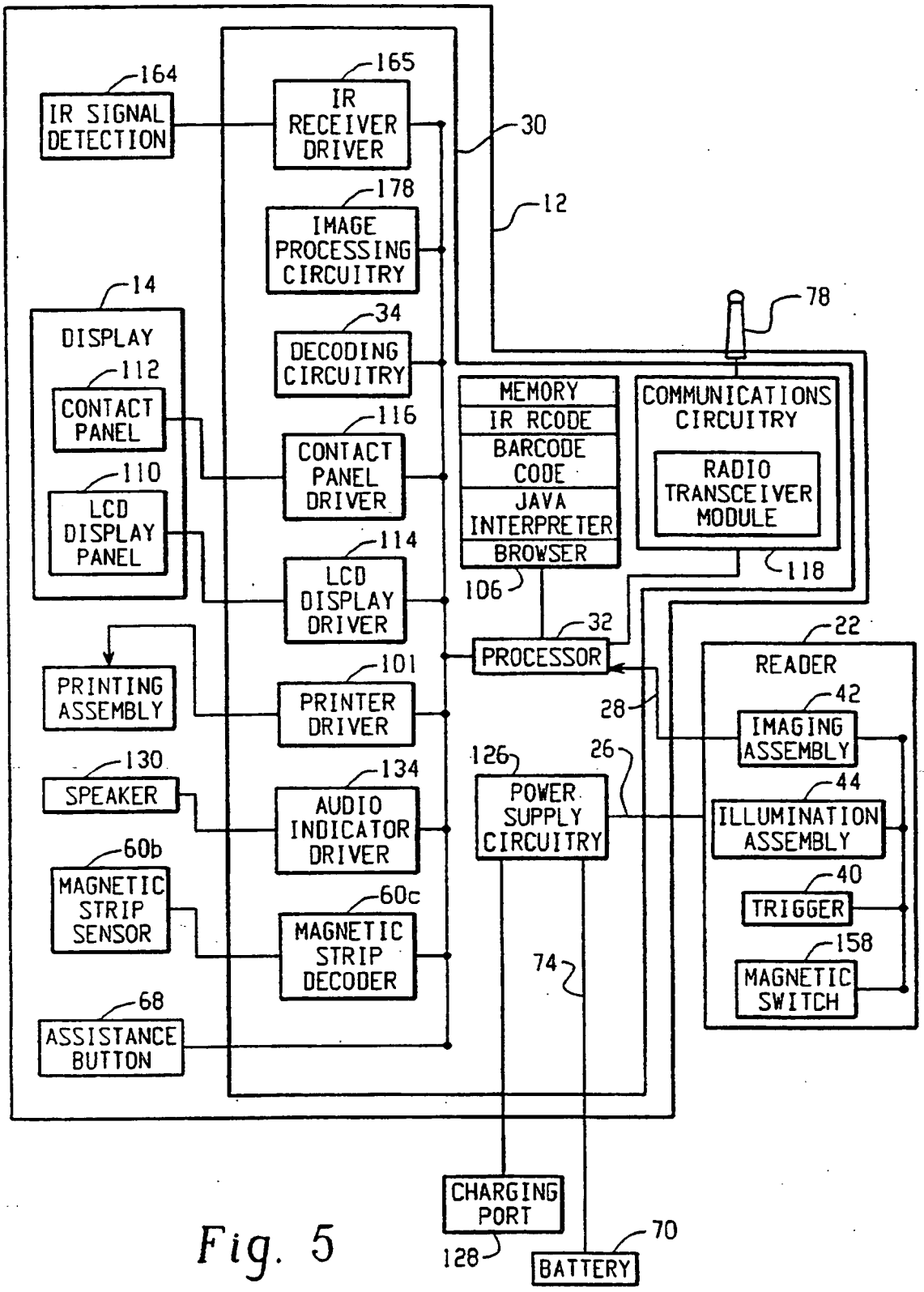


Fig. 5

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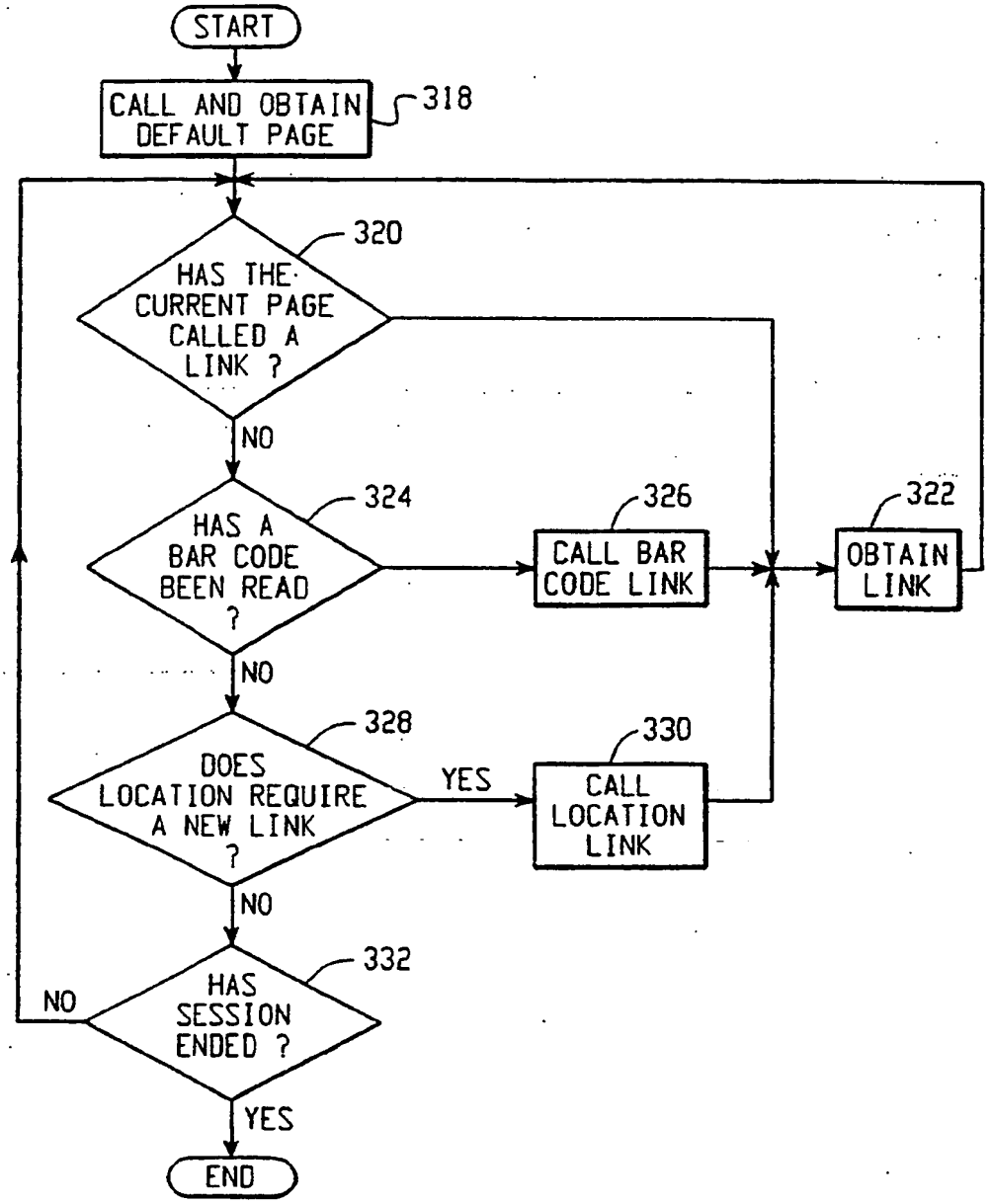


Fig. 6

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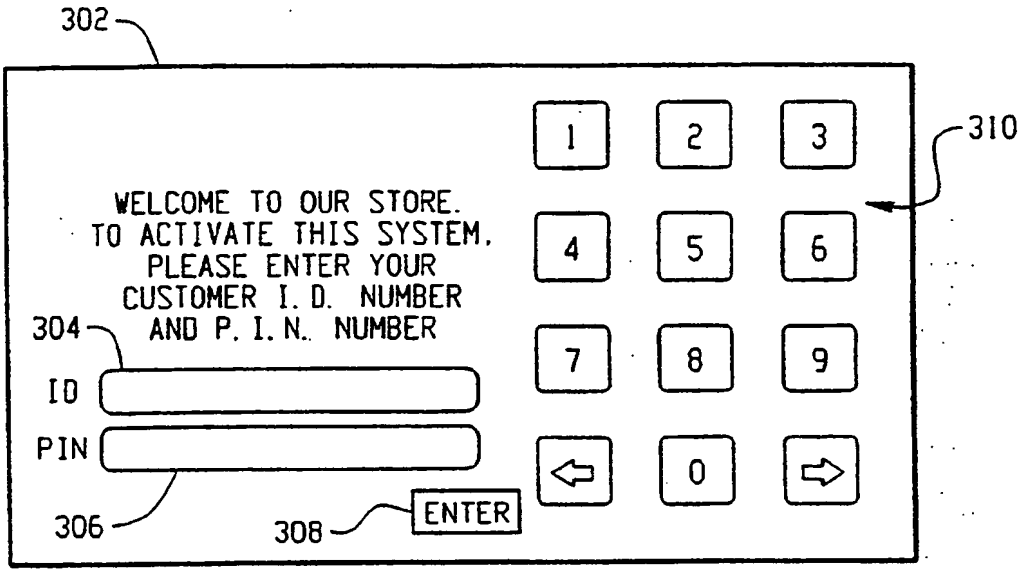


Fig. 7

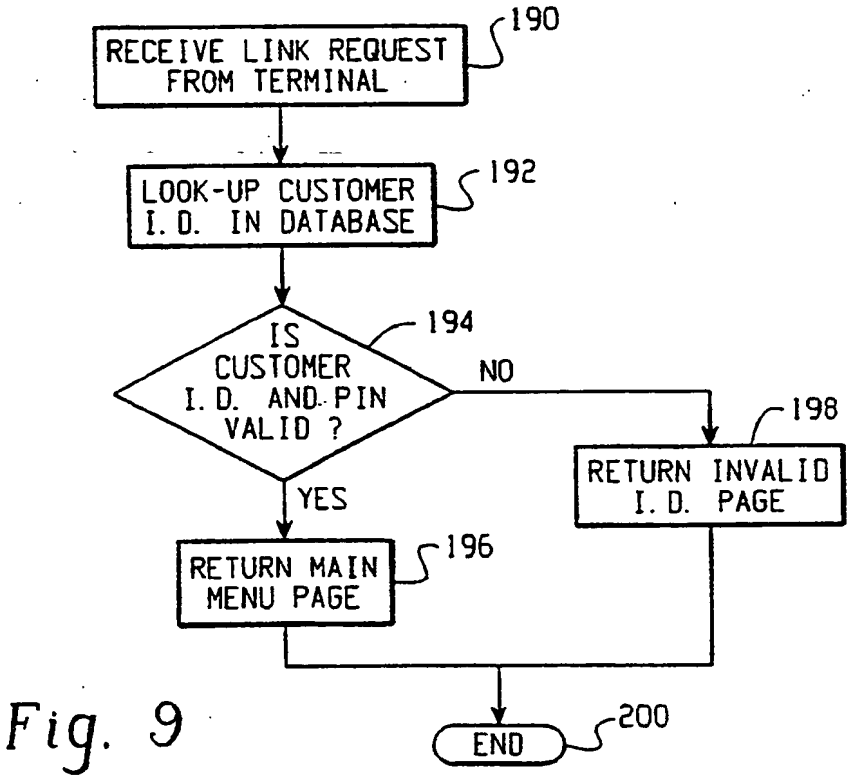


Fig. 9

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SERVER		
HTML PAGE STORAGE	DATA BASE STORAGE	PROGRAMS
INTRODUCTORY PAGE	UPC	CUSTOMER VERIFICATION PROGRAM
INVALID I.D. PAGE	PRICE	BAR CODE READ PROGRAM
MAIN MENU PAGE	DESCRIPTION	LOCATION SEARCH PROGRAM
GENERIC CONFIRM PURCHASE PAGE	RECIPES	RECIPE SEARCH PROGRAM
CUSTOM CONFIRM PURCHASE PAGES	STORE LOCATIONS	RUNNING TOTAL PROGRAM
LOCATION BASED ADVERTISEMENT PAGES	PURCHASE HISTORY LOG	CHECK-OUT PROGRAM
RECIPE SELECTION SUB-MENU PAGE		CUSTOMER LOCATION PROGRAM
RECIPE FORM PAGE		
STORE MAP PAGE		
CHECK-OUT PAGE		
PREPARED ORDER ITEM SUB-MENU PAGE		

Fig. 8

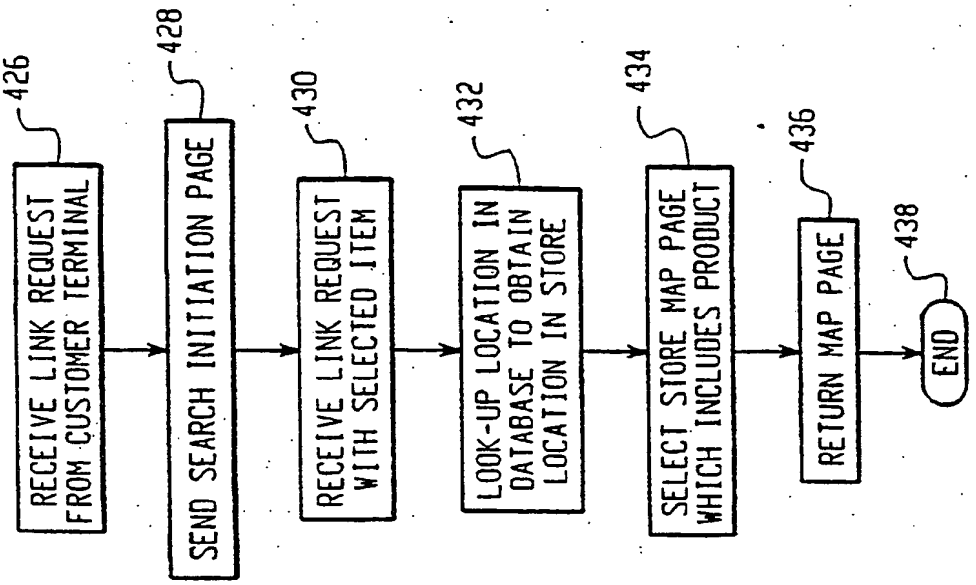


Fig. 13

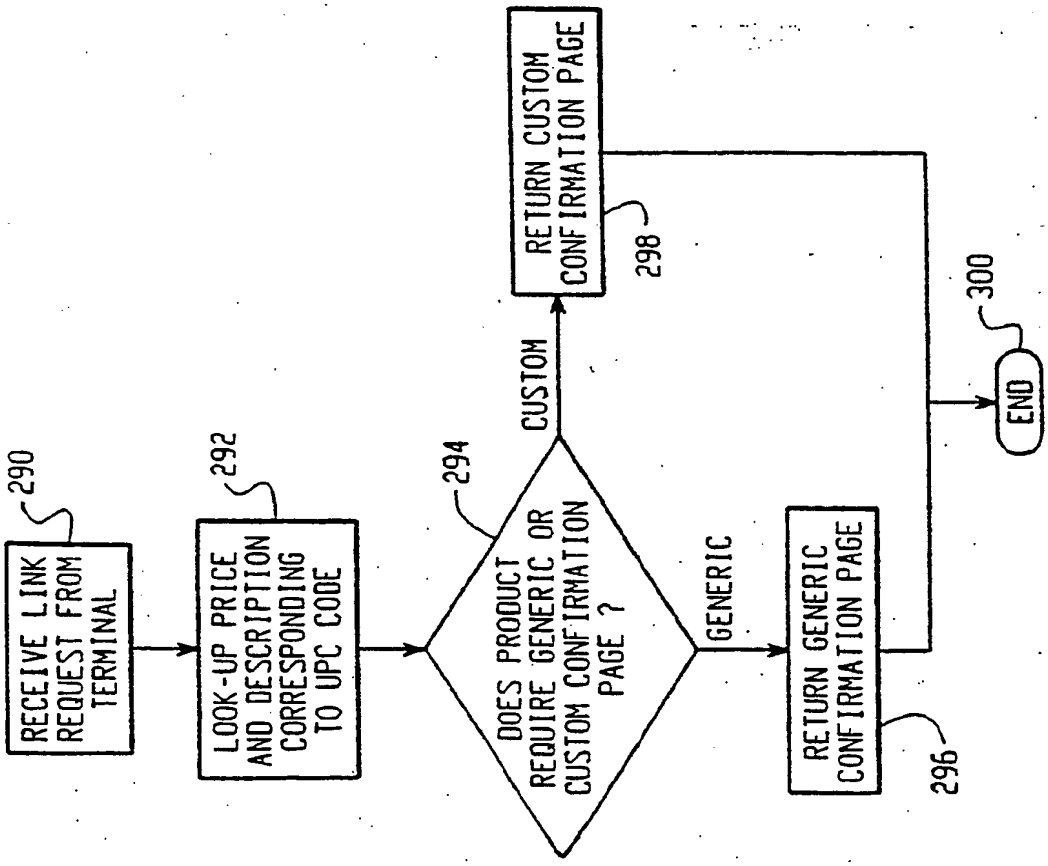


Fig. 10

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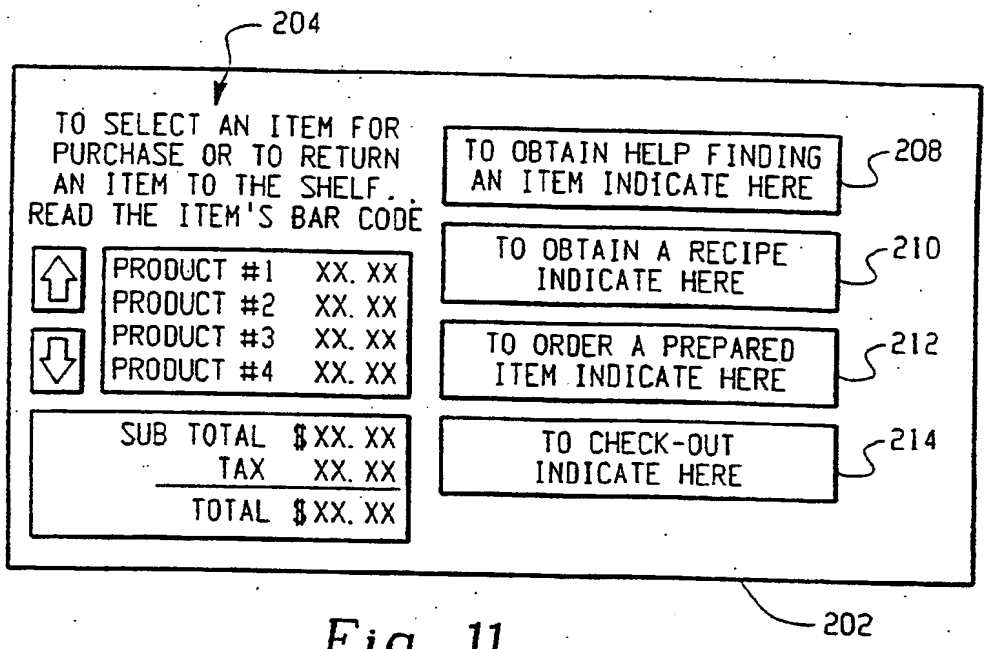

204
TO SELECT AN ITEM FOR PURCHASE OR TO RETURN AN ITEM TO THE SHELF. READ THE ITEM'S BAR CODE
PRODUCT #1 XX. XX
PRODUCT #2 XX. XX
PRODUCT #3 XX. XX
PRODUCT #4 XX. XX
SUB TOTAL $XX. XX
TAX XX. XX
TOTAL $XX. XX
TO OBTAIN HELP FINDING AN ITEM INDICATE HERE
208
TO OBTAIN A RECIPE INDICATE HERE
210
TO ORDER A PREPARED ITEM INDICATE HERE
212
TO CHECK-OUT INDICATE HERE
214
202

Fig. 11

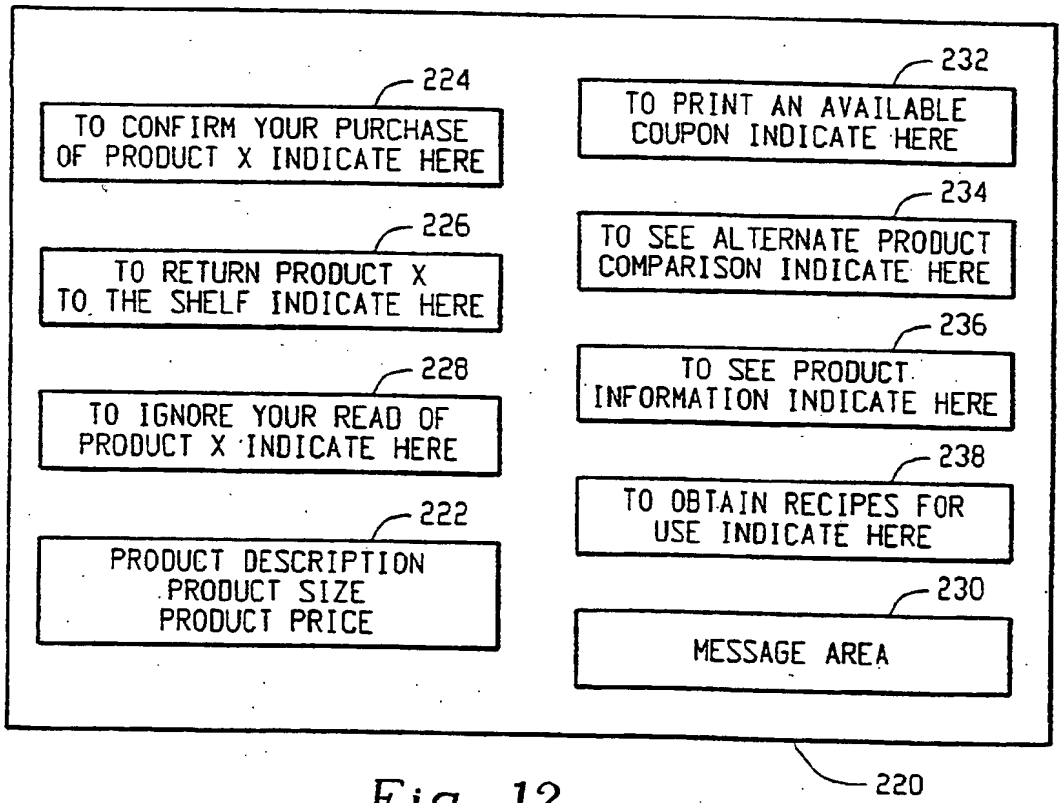

224
TO CONFIRM YOUR PURCHASE OF PRODUCT X INDICATE HERE
226
TO RETURN PRODUCT X TO THE SHELF INDICATE HERE
228
TO IGNORE YOUR READ OF PRODUCT X INDICATE HERE
222
PRODUCT DESCRIPTION
PRODUCT SIZE
PRODUCT PRICE
232
TO PRINT AN AVAILABLE COUPON INDICATE HERE
234
TO SEE ALTERNATE PRODUCT COMPARISON INDICATE HERE
236
TO SEE PRODUCT INFORMATION INDICATE HERE
238
TO OBTAIN RECIPES FOR USE INDICATE HERE
230
MESSAGE AREA
220

Fig. 12

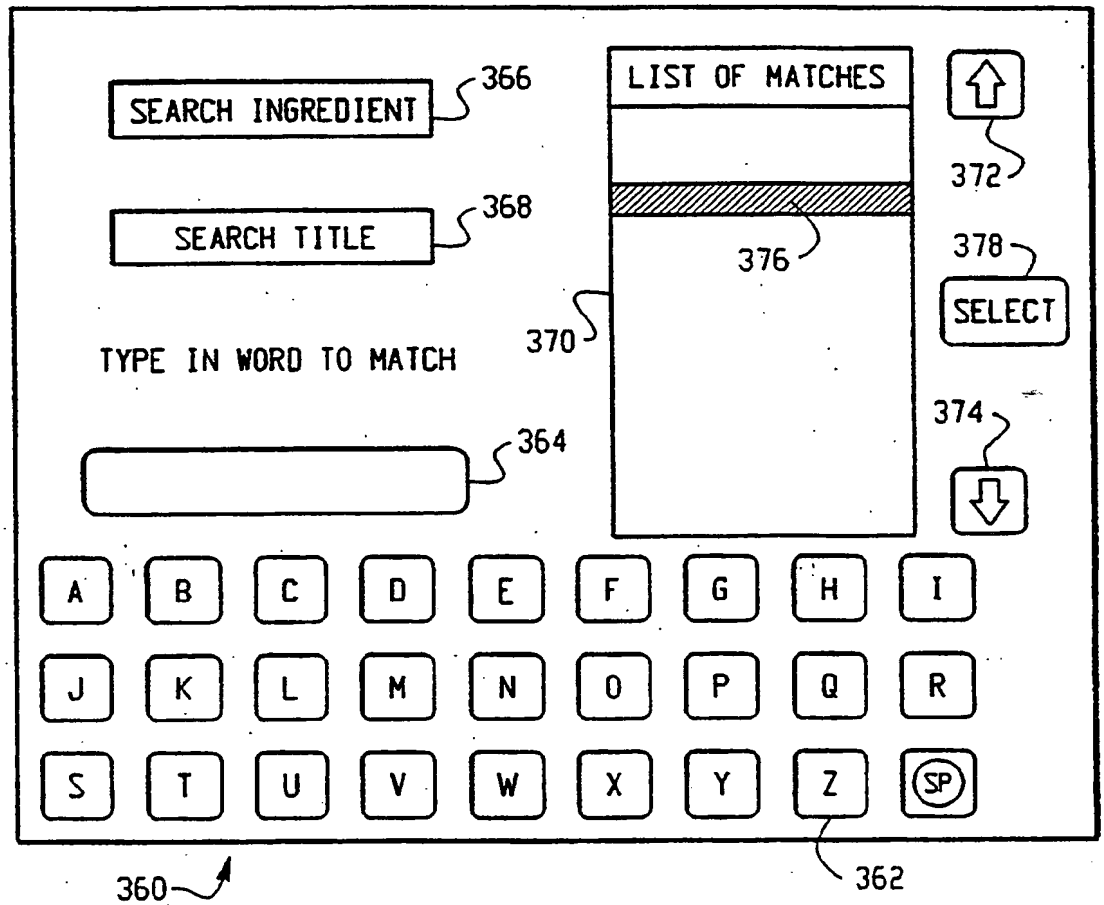


Fig. 14

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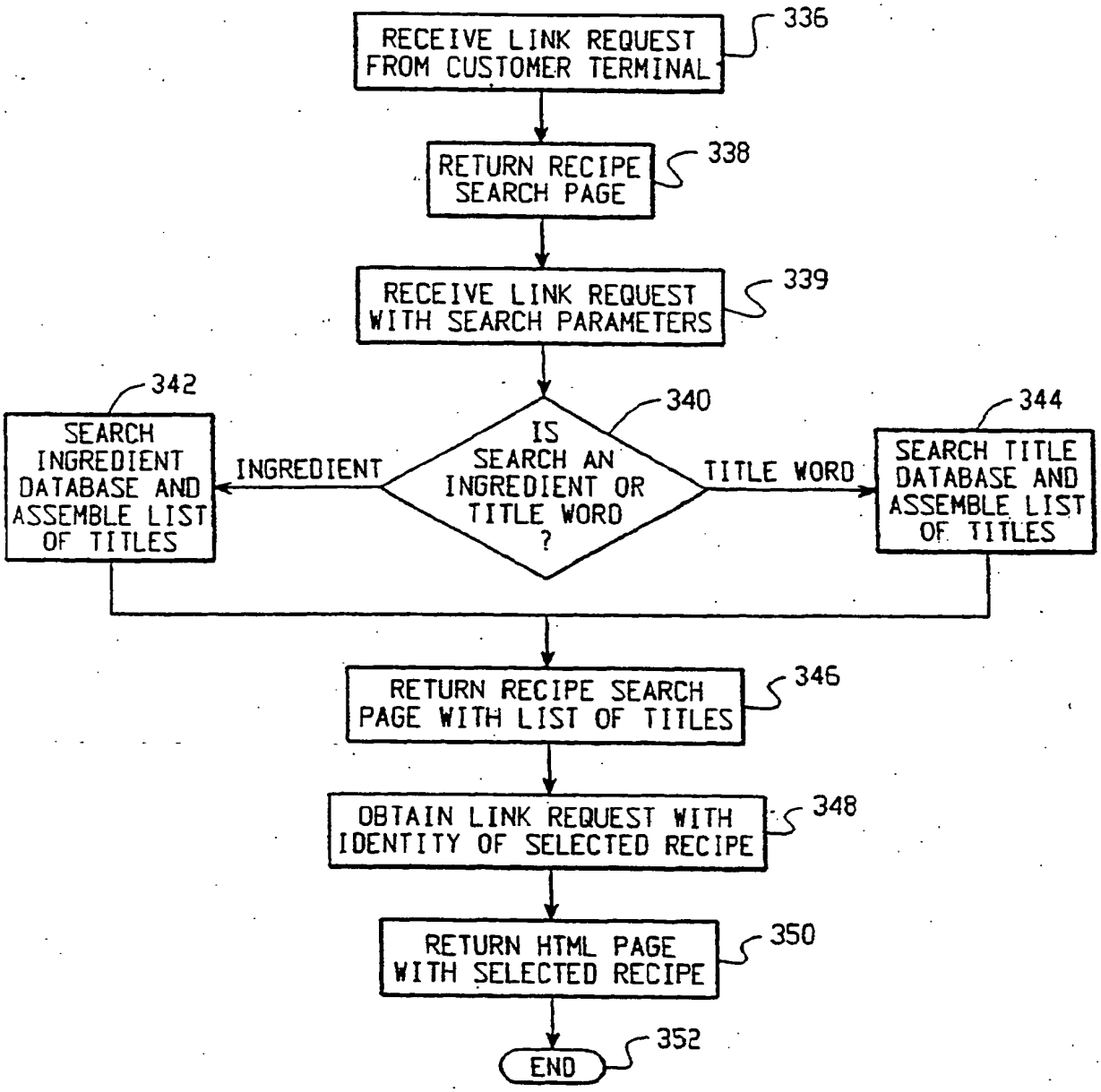

RECEIVE LINK REQUEST FROM CUSTOMER TERMINAL
336
RETURN RECIPE SEARCH PAGE
338
RECEIVE LINK REQUEST WITH SEARCH PARAMETERS
339
342
SEARCH INGREDIENT DATABASE AND ASSEMBLE LIST OF TITLES
340
IS SEARCH AN INGREDIENT OR TITLE WORD ?
INGREDIENT
TITLE WORD
344
SEARCH TITLE DATABASE AND ASSEMBLE LIST OF TITLES
RETURN RECIPE SEARCH PAGE WITH LIST OF TITLES
346
OBTAIN LINK REQUEST WITH IDENTITY OF SELECTED RECIPE
348
RETURN HTML PAGE WITH SELECTED RECIPE
350
END
352

Fig. 15

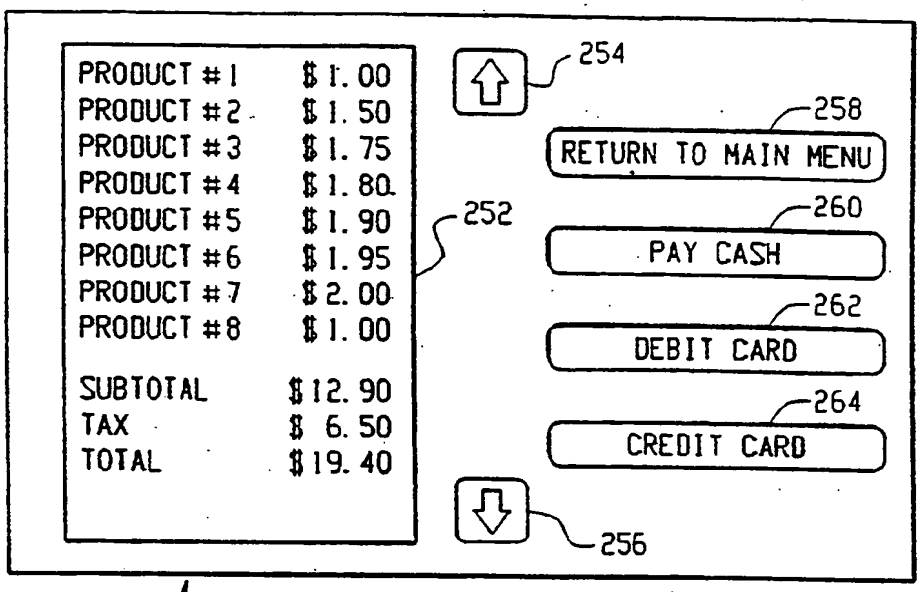


Fig. 16

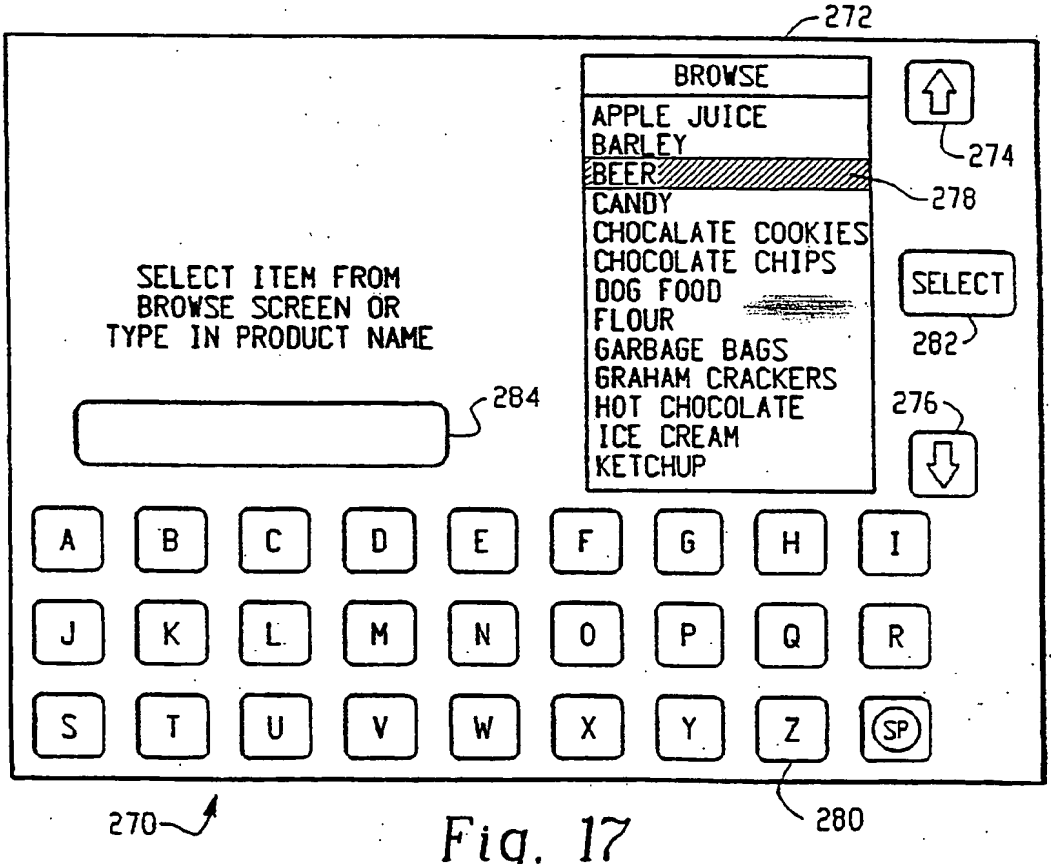


Fig. 17

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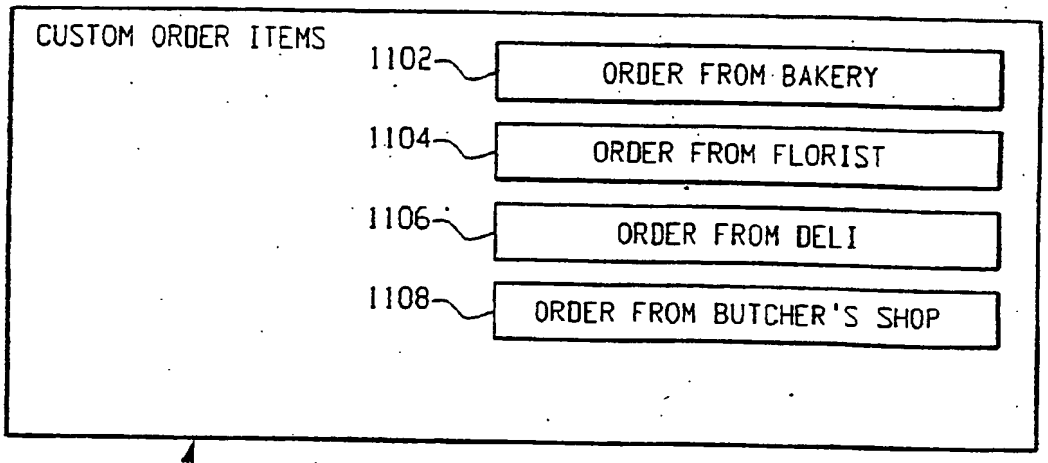


Fig. 18

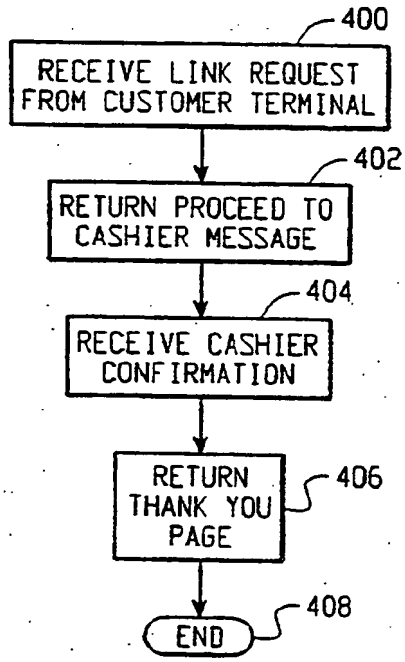


Fig. 19a

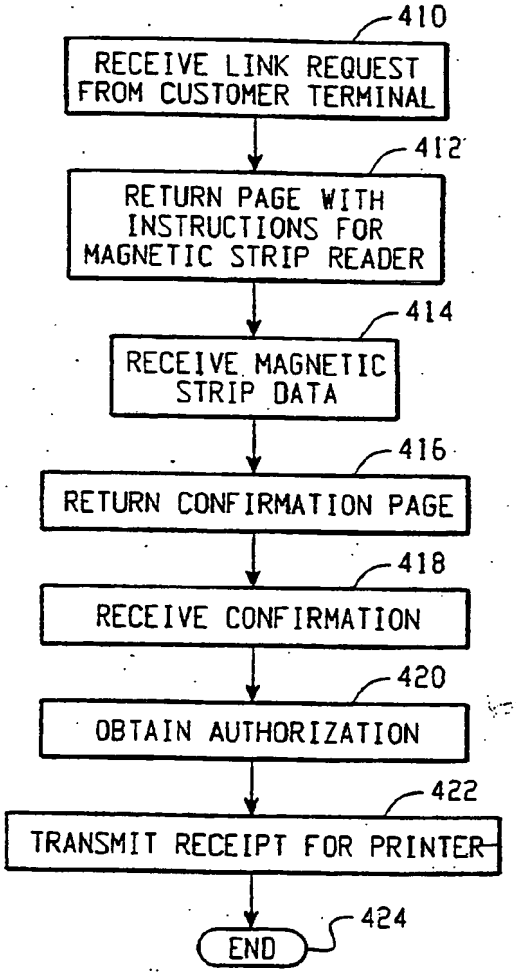


Fig. 19b

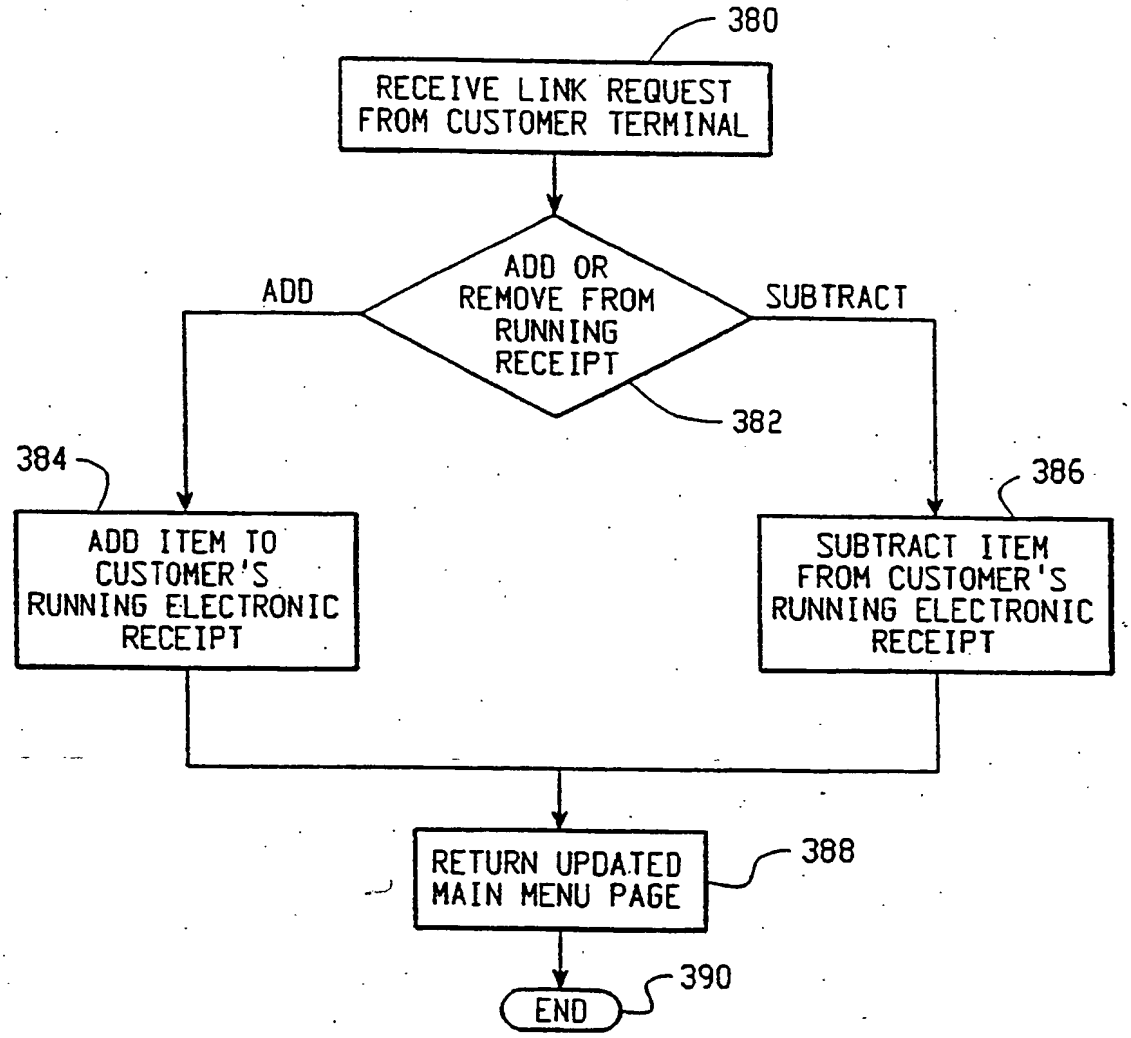


Fig. 20

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